LAND
infrared

SYSTEM4

Thermometer

User Guide

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Issue B 03/02

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0034

The Quality Management System of Land Instruments International Ltd. is approved to BS EN ISO9001:2000 for the design and manufacture, stockholding, in-house repair and site servicing of non contact temperature measuring instrumentation. Associated software designed and developed in accordance with TickIT.

Calibration certificates are available from our UKAS accredited Calibration Laboratory No. 0034. The Land calibration laboratory complies with the requirements of the international standard BS EN/IEC 17025.

CE

This product complies with current European directives relating to electromagnetic compatibility and safety (EMC directive 89/336/EEC; Low voltage directive 73/23/EEC).

All packaging material used for this product is 100%

LANDMARK

Landmark ® is a registered trademark of Land Instruments International Ltd.

User Guide Thermometer

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SYSTEM4 *Quality Assurance*

SAFETY INFORMATION

Symbol	Publication	Description
	IEC 417, No. 5031	Direct current
	IEC 417, No. 5032	Alternating current
	IEC 417, No. 5033	Both direct and alternating current
	IEC 617-2, No. 02-02-06	Three-phase alternating current
	IEC 417, No. 5017	Earth (ground) terminal
	IEC 417, No. 5019	Protective conductor terminal
	IEC 417, No. 5020	Frame or chassis terminal
	IEC 417, No. 5021	Equipotentiality
	IEC 417, No. 5007	On (Supply)
	IEC 417, No. 5008	Off (Supply)
	IEC 417, No. 5172	Equipment protected throughout by double insulation or reinforced insulation (equivalent to Class II of IEC 536)

Thermometer User Guide

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Safety Information SYSTEM4

SAFETY INFORMATION (Continued)

Symbol	Publication	Description
	ISO 3864, No. B.3.6	Caution, risk of electric shock
	ISO 3864, No. B.3.1	Caution
	BS EN 100015	Observe precautions for handling electrostatic discharge sensitive devices
	BS EN 60825: 1992	Warning, laser radiation
		Warning, hot surface
		Refer to the Operating Instructions.

User Guide Thermometer

SAFETY INFORMATION (Continued)

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	BS EN 100015	Observe precautions for handling electrostatic discharge sensitive devices
	BS EN 60825: 1992	Warning, laser radiation
		Warning, hot surface
		Refer to the Operating Instructions.

SYSTEM4 Safety Information

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Thermometer User Guide

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SYSTEM4

Contents

1.0 INTRODUCTION 1

1.1 About this guide 1
1.2 About the thermometer 1
1.3 About System 4 1
1.4 Unpacking the thermometer 1
1.5 Nomenclature 3

2.0 SPECIFICATIONS 4

2.1 M1 Series Thermometers 4
2.2 M2 Series Thermometers 5
2.3 M4 Series Thermometers 6
2.4 M5 Series Thermometers 7
2.5 M6 Series Thermometers 8
2.6 M7 Series Thermometers 9
2.7 M8 Series Thermometers 10
2.8 R1 Series Thermometers 11

3.0 INSTALLING THE THERMOMETER 12

3.1 Choosing a location for the thermometer 12

4.0 USING THE THERMOMETER 14

4.1 Focusing the lens on the target 14
4.2 Electrical Connections 16

5.0 EMISSIVITY TABLES 19

5.1 Refractories 19
5.2 Alloys 19
5.3 Metals 20
5.4 Plastics 21
5.5 Miscellaneous 22

6.0 MAINTENANCE 23

User Guide Thermometer

Contents

1.0 INTRODUCTION 1

1.1 About this guide 1
1.2 About the thermometer 1
1.3 About System 4 1
1.4 Unpacking the thermometer 1
1.5 Nomenclature 3

2.0 SPECIFICATIONS 4

2.1 M1 Series Thermometers 4
2.2 M2 Series Thermometers 5
2.3 M4 Series Thermometers 6
2.4 M5 Series Thermometers 7
2.5 M6 Series Thermometers 8
2.6 M7 Series Thermometers 9
2.7 M8 Series Thermometers 10
2.8 R1 Series Thermometers 11

3.0 INSTALLING THE THERMOMETER 12

3.1 Choosing a location for the thermometer 12

4.0 USING THE THERMOMETER 14

4.1 Focusing the lens on the target 14
4.2 Electrical Connections 16

5.0 EMISSIVITY TABLES 19

5.1 Refractories 19
5.2 Alloys 19
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5.4 Plastics 21
5.5 Miscellaneous 22

6.0 MAINTENANCE 23

SYSTEM4 *Contents*

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Thermometer User Guide

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SYSTEM4

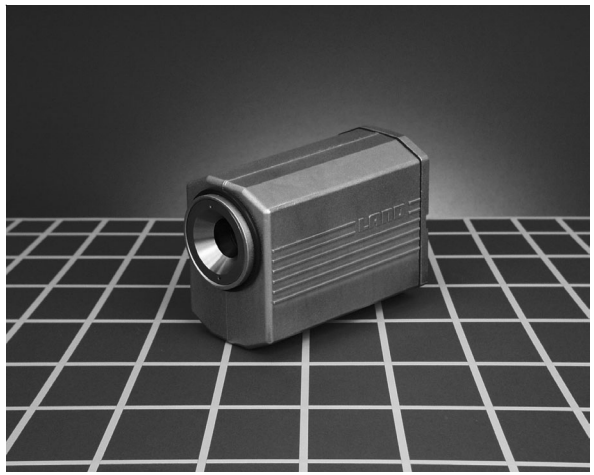


Fig. 1 Land System 4 thermometer S4970222

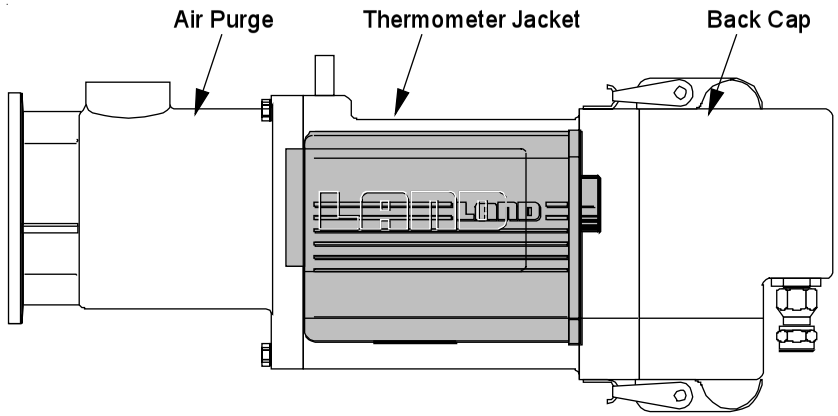


Fig. 2 System 4 Thermometer with Air Purge, Protection Jacket and Back Cap S4970223

User Guide Thermometer

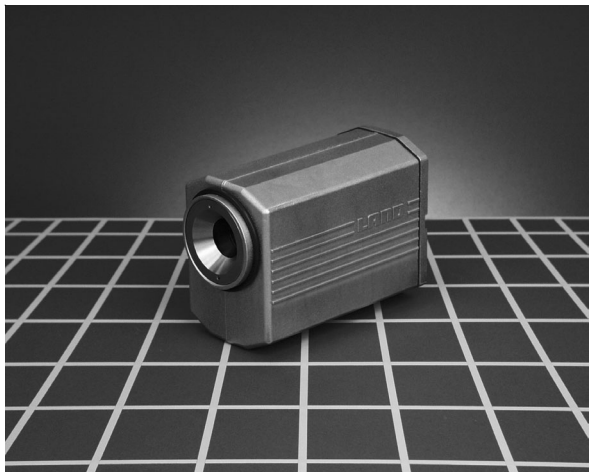
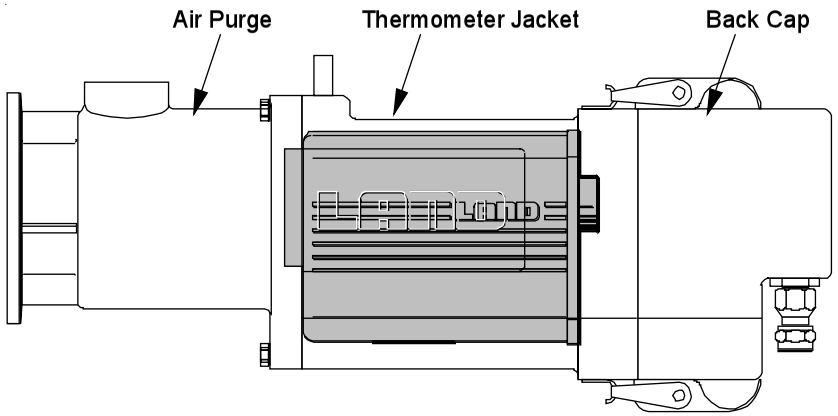


Fig. 1 Land System 4 thermometer S4970222



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Thermometer User Guide

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SYSTEM4

1.0 INTRODUCTION

1.1 About this guide

This guide gives the information necessary for you to operate a LAND System 4 Thermometer. Basic information regarding installation is contained within the Installation Guide. More detailed information regarding servicing, repair and calibration of the thermometer is contained in the Service Manual.

1.2 About the thermometer

The LAND System 4 thermometer is a highly accurate, focusable, non contact thermometer designed for use in conjunction with the System 4 Landmark processors.

The thermometer features include:

- Focusable optical system with through-the-lens sighting to give precise target definition.
- 4 to 20mA output, linear over the temperature span of the thermometer.

1.3 About System 4

LAND System 4 is a range of high accuracy thermometers, state of the art processors and rugged mounting accessories designed to provide precise, non contact temperature measurement in a wide range of industrial applications.

An air purge, protection jacket and back cap are available for use with the thermometer in hostile locations.

1.4 Unpacking the thermometer

The package containing the thermometer will contain the following items:

- Envelope containing this User Guide.
- Binder, for your thermometer and processor user documentation.
- System 4 thermometer (fitted with protection caps on the lens and the eyepiece).
- Eye comfort filter. Fitted only to instruments where the temperature range exceeds 1600°C/2900°F.
- The thermometer will be supplied pre-fitted with either a Standard lens (denoted VG/VC) or a Short Focus lens (denoted SG/SF).

It is recommended that the front lens protection cap is kept attached until the thermometer is installed and that the eyepiece cap continues to be used after installation.

User Guide Thermometer

1.0 INTRODUCTION

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SYSTEM4 Page 1

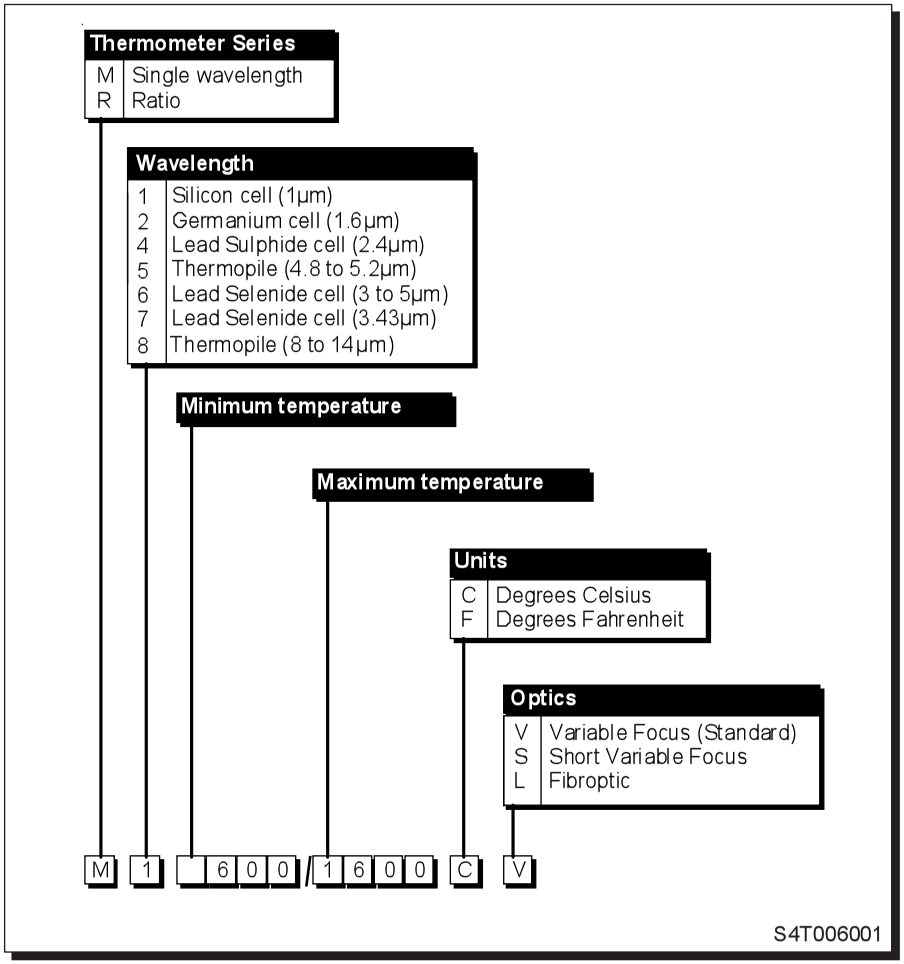

Fig. 3 System 4 Thermometer nomenclature

Thermometer User Guide

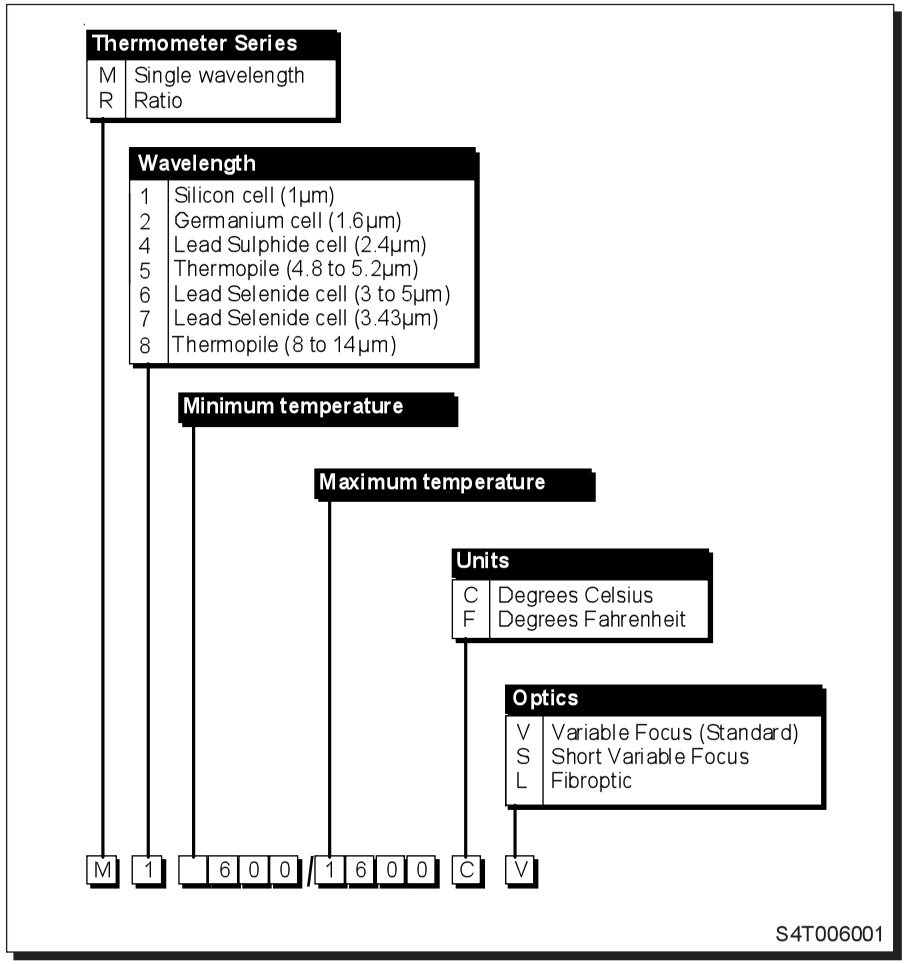

Fig. 3 System 4 Thermometer nomenclature

Page 2 SYSTEM4

1.5 Nomenclature

The thermometer detail label is on the rear face of the thermometer above the eyepiece. The thermometer instrument type nomenclature is explained in Fig. 3.

Make a note of your thermometers instrument type and Serial Number in the space provided below. This information is required to configure a Landmark processor to work with your thermometer.

Instrument type: ☐☐☐/☐☐☐☐/☐☐☐☐☐

Serial Number: ☐☐☐☐☐☐/☐☐☐/☐☐

User Guide Thermometer

1.5 Nomenclature

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Instrument type: ☐☐☐/☐☐☐☐/☐☐☐☐☐

Serial Number: ☐☐☐☐☐☐/☐☐☐/☐☐

2.0 SPECIFICATIONS

2.1 M1 Series Thermometers

Thermometer Model	M1 450/1000C	M1 850/1850F	M1 600/1600C	M1 1100/2900F	M1 800/2600C	M1 1500/4700F
Temperature Range:	450 to 1000°C	850 to 1850°F	600 to 1600°C	1100 to 2900°F	800 to 2600°C	1500 to 4700°F
Wavelength:	1µm					
Response Time:	5ms (0 to 95%)					
Sighting:	6° through the lens					
Target Size:	>98% of energy within graticule					
Magnification:	1.8x					
Eye Relief:	30mm (1.2in)					
Field Of View (Nominal):	30:1		100:1		200:1	
Focus Range						
Standard:	0.5m (19.7in) to infinity					
Short Variable Focus:	0.35m (13.6in) to 1.0m (39.3in)					
Min. Target Diameter:	11.7mm (0.70in)		3.5mm (0.13in)		1.8mm (0.07in)	
Accuracy						
Repeatability:	≤1K				≤2K	
Absolute:	0.4%K				0.7%K	
Stability (Temperature):	0.2°/°ambient				0.3°/°ambient	
Stability (Time):	2°C (4°F) per year					
Vibration:	3G any axis 10 to 300 Hz					
Humidity:	0 to 99% non condensing					
Sealing:	To IP65 / NEMA 4X requirements					
Ambient Temperature						
Specified:	0 to 70°C (32 to 158°F)					
Operating:	-10 to 80°C (14 to 176°F)					
CE	EN 50-082-2 (immunity) EN 50-081-1 (emission) IEC 1010 (safety)					

Thermometer User Guide

2.0 SPECIFICATIONS

2.1 M1 Series Thermometers

Thermometer Model	M1 450/1000C	M1 850/1850F	M1 600/1600C	M1 1100/2900F	M1 800/2600C	M1 1500/4700F
Temperature Range:	450 to 1000°C	850 to 1850°F	600 to 1600°C	1100 to 2900°F	800 to 2600°C	1500 to 4700°F
Wavelength:	1µm					
Response Time:	5ms (0 to 95%)					
Sighting:	6° through the lens					
Target Size:	>98% of energy within graticule					
Magnification:	1.8x					
Eye Relief:	30mm (1.2in)					
Field Of View (Nominal):	30:1		100:1		200:1	
Focus Range						
Standard:	0.5m (19.7in) to infinity					
Short Variable Focus:	0.35m (13.6in) to 1.0m (39.3in)					
Min. Target Diameter:	11.7mm (0.70in)		3.5mm (0.13in)		1.8mm (0.07in)	
Accuracy						
Repeatability:	≤1K				≤2K	
Absolute:	0.4%K				0.7%K	
Stability (Temperature):	0.2°/°ambient				0.3°/°ambient	
Stability (Time):	2°C (4°F) per year					
Vibration:	3G any axis 10 to 300 Hz					
Humidity:	0 to 99% non condensing					
Sealing:	To IP65 / NEMA 4X requirements					
Ambient Temperature						
Specified:	0 to 70°C (32 to 158°F)					
Operating:	-10 to 80°C (14 to 176°F)					
CE	EN 50-082-2 (immunity) EN 50-081-1 (emission) IEC 1010 (safety)					

2.2 M2 Series Thermometers

Thermometer Model	M2 300/1100C	M2 600/2000F
Temperature range:	300 to 1100°C	600 to 2000°F
Wavelength:	1.6µm	
Response time:	5ms (0 to 95%)	
Sighting:	6°, through the lens	
Target size:	≥98% of energy within graticule image	
Magnification:	1.8x	
Eye relief:	30mm (1.2in)	
Field of view (nominal):	100:1	
Focus range:		
Standard:	0.5m (19.7in) to infinity	
Short variable focus:	0.35m (13.6in) to 1.0m (39.3in)	
Min. target diameter:	3.5mm (0.13in)	
Accuracy		
Repeatability:	≤1K	
Absolute:	0.25%K + 1K	
Stability (Temp):	0.2°/°ambient	
Stability (Time):	2°C (4°F) per year	
Vibration:	3G Any axis 10 to 300 Hz	
Humidity:	0 to 99% non condensing	
Sealing:	IP65	
Ambient temperature:		
Specified:	0 to 50°C (32 to 122°F)	
Operating:	-10 to 60°C (14 to 140°F)	
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)	

User Guide Thermometer

2.2 M2 Series Thermometers

Thermometer Model	M2 300/1100C	M2 600/2000F
Temperature range:	300 to 1100°C	600 to 2000°F
Wavelength:	1.6µm	
Response time:	5ms (0 to 95%)	
Sighting:	6°, through the lens	
Target size:	≥98% of energy within graticule image	
Magnification:	1.8x	
Eye relief:	30mm (1.2in)	
Field of view (nominal):	100:1	
Focus range:		
Standard:	0.5m (19.7in) to infinity	
Short variable focus:	0.35m (13.6in) to 1.0m (39.3in)	
Min. target diameter:	3.5mm (0.13in)	
Accuracy		
Repeatability:	≤1K	
Absolute:	0.25%K + 1K	
Stability (Temp):	0.2°/°ambient	
Stability (Time):	2°C (4°F) per year	
Vibration:	3G Any axis 10 to 300 Hz	
Humidity:	0 to 99% non condensing	
Sealing:	IP65	
Ambient temperature:		
Specified:	0 to 50°C (32 to 122°F)	
Operating:	-10 to 60°C (14 to 140°F)	
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)	

SYSTEM4 Page 5

2.3 M4 Series Thermometers

Thermometer Model	M4 50/250C	M4 150/500F	M4 150/550C	M4 300/1000F
Temperature range:	50 to 250°C	150 to 500°F	150 to 550°C	300 to 1000°F
Wavelength:	2.4µm			
Response time:	100ms/0 to 95%			
Sighting:	6°, through the lens			
Target size:	≥98% of energy within graticule image			
Magnification:	1.8x			
Eye relief:	30mm/1.2in			
Field of view (nominal):	30:1		100:1	
Focus range:				
Standard:	0.5m/19.7in to infinity			
Short variable focus	0.35m/13.6in to 1.0m/39.3in			
Min. target diameter:	11.7mm/0.46in		3.5mm/0.13in	
Accuracy				
Repeatability:	≤1K		≤1K	
Absolute:	3K		4K	
Stability (Temp):	0.1°/°ambient			
Stability (Time):	1°C/2°F per year			
Vibration:	3G Any axis 10 to 300 Hz			
Humidity:	0 to 99% non condensing			
Sealing:	IP65			
Ambient temperature:				
Specified:	5 to 45°C/41 to 113°F			
Operating:	0 to 50°C/32 to 122°F			
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)			

Thermometer User Guide

2.3 M4 Series Thermometers

Thermometer Model	M4 50/250C	M4 150/500F	M4 150/550C	M4 300/1000F
Temperature range:	50 to 250°C	150 to 500°F	150 to 550°C	300 to 1000°F
Wavelength:	2.4µm			
Response time:	100ms/0 to 95%			
Sighting:	6°, through the lens			
Target size:	≥98% of energy within graticule image			
Magnification:	1.8x			
Eye relief:	30mm/1.2in			
Field of view (nominal):	30:1		100:1	
Focus range:				
Standard:	0.5m/19.7in to infinity			
Short variable focus	0.35m/13.6in to 1.0m/39.3in			
Min. target diameter:	11.7mm/0.46in		3.5mm/0.13in	
Accuracy				
Repeatability:	≤1K		≤1K	
Absolute:	3K		4K	
Stability (Temp):	0.1°/°ambient			
Stability (Time):	1°C/2°F per year			
Vibration:	3G Any axis 10 to 300 Hz			
Humidity:	0 to 99% non condensing			
Sealing:	IP65			
Ambient temperature:				
Specified:	5 to 45°C/41 to 113°F			
Operating:	0 to 50°C/32 to 122°F			
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)			

Page 6 SYSTEM4

2.4 M5 Series Thermometers

Thermometer Model	M5 400/1300C	M5 750/2400F	M5 1000/2500C	M5 1800/4500F
Temperature range:	400 to 1300°C	750 to 2400°F	1000 to 2500°C	1800 to 4500°F
Wavelength:	4.8 to 5.2µm			
Response time:	100ms (0 to 95%)			
Sighting:	6°, through the lens			
Target size:	≥98% of energy within graticule image			
Magnification:	1.8x			
Eye relief:	30mm (1.2in)			
Field of view (nominal):	100:1			
Focus range:				
Standard:	0.5m (19.7in) to infinity			
Short variable focus	0.35m (13.6in) to 1.0m (39.3in)			
Min. target diameter:	3.5mm (0.13in)			
Accuracy				
Repeatability	1K		1K	
Absolute:	0.6%K		0.5%K	
Stability (Temp):	0.02%T(K)/°Cambient			
Stability (Time):	2°C (4°F) per year			
Vibration:	3G Any axis 10 to 300 Hz			
Humidity:	0 to 99% non condensing			
Sealing:	IP65			
Ambient temperature:				
Specified:	0 to 70°C (32 to 158°F)			
Operating:	-10 to 80°C (14 to 176°F)			
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)			

User Guide Thermometer

2.4 M5 Series Thermometers

Thermometer Model	M5 400/1300C	M5 750/2400F	M5 1000/2500C	M5 1800/4500F
Temperature range:	400 to 1300°C	750 to 2400°F	1000 to 2500°C	1800 to 4500°F
Wavelength:	4.8 to 5.2µm			
Response time:	100ms (0 to 95%)			
Sighting:	6°, through the lens			
Target size:	≥98% of energy within graticule image			
Magnification:	1.8x			
Eye relief:	30mm (1.2in)			
Field of view (nominal):	100:1			
Focus range:				
Standard:	0.5m (19.7in) to infinity			
Short variable focus	0.35m (13.6in) to 1.0m (39.3in)			
Min. target diameter:	3.5mm (0.13in)			
Accuracy				
Repeatability	1K		1K	
Absolute:	0.6%K		0.5%K	
Stability (Temp):	0.02%T(K)/°Cambient			
Stability (Time):	2°C (4°F) per year			
Vibration:	3G Any axis 10 to 300 Hz			
Humidity:	0 to 99% non condensing			
Sealing:	IP65			
Ambient temperature:				
Specified:	0 to 70°C (32 to 158°F)			
Operating:	-10 to 80°C (14 to 176°F)			
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)			

SYSTEM4 Page 7

2.5 M6 Series Thermometers

Thermometer Model	M6 0/300C	M6 50/600F	M6 100/700C	M6 200/1300F
Temperature range:	0 to 300°C	50 to 600°F	100 to 700°C	200 to 1300°F
Wavelength:	3 to 5µm (nominal)			
Response time:	<100ms (0 to 95%)			
Sighting:	6°, through the lens			
Target size:	≥98% of energy within graticule image			
Magnification:	1.8x			
Eye relief:	30mm/1.2in			
Field of view (nominal):	30:1		100:1	
Focus range:				
Standard:	0.5m/19.7in to infinity			
Short variable focus	0.35m/13.6in to 1.0m/39.3in			
Min. target diameter:	11.7mm/0.46in		3.5mm/0.13in	
Accuracy				
Repeatability:	<1K		<1K	
Absolute:	0.3%K + 1.5K		0.3%K + 2K	
Stability (Temp):	0.15°/°ambient		0.2°/°ambient	
Stability (Time):	2°C/4°F per year			
Vibration:	3G Any axis 10 to 300 Hz			
Humidity:	0 to 99% non condensing			
Sealing:	IP65			
Ambient temperature:				
Specified:	5 to 45°C/41 to 113°F			
Operating:	0 to 50°C/32 to 122°F			
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)			

Thermometer User Guide

2.5 M6 Series Thermometers

Thermometer Model	M6 0/300C	M6 50/600F	M6 100/700C	M6 200/1300F
Temperature range:	0 to 300°C	50 to 600°F	100 to 700°C	200 to 1300°F
Wavelength:	3 to 5µm (nominal)			
Response time:	<100ms (0 to 95%)			
Sighting:	6°, through the lens			
Target size:	≥98% of energy within graticule image			
Magnification:	1.8x			
Eye relief:	30mm/1.2in			
Field of view (nominal):	30:1		100:1	
Focus range:				
Standard:	0.5m/19.7in to infinity			
Short variable focus	0.35m/13.6in to 1.0m/39.3in			
Min. target diameter:	11.7mm/0.46in		3.5mm/0.13in	
Accuracy				
Repeatability:	<1K		<1K	
Absolute:	0.3%K + 1.5K		0.3%K + 2K	
Stability (Temp):	0.15°/°ambient		0.2°/°ambient	
Stability (Time):	2°C/4°F per year			
Vibration:	3G Any axis 10 to 300 Hz			
Humidity:	0 to 99% non condensing			
Sealing:	IP65			
Ambient temperature:				
Specified:	5 to 45°C/41 to 113°F			
Operating:	0 to 50°C/32 to 122°F			
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)			

Page 8 SYSTEM4

2.6 M7 Series Thermometers

Thermometer Model	M7 25/375C	M7 75/700F
Temperature range:	25 to 375°C	75 to 700°F
Wavelength:	3.43µm (nominal)	
Response time:	<100ms (0 to 95%)	
Sighting:	6°, through the lens	
Target size:	≥98% of energy within graticule image	
Magnification:	1.8x	
Eye relief:	30mm/1.2in	
Field of view (nominal):	30:1	
Focus range:		
Standard:	0.5m/19.7in to infinity	
Short variable focus	0.35m/13.6in to 1.0m/39.3in	
Min. target diameter:	11.7mm/0.46in	
Accuracy		
Repeatability	1.5°C/2.7°F	
Absolute:	3K	
Stability (Temp):	0.1°/° amb	
Stability (Time):	2°C/4°F per year	
Vibration:	3G Any axis 10 to 300 Hz	
Humidity:	0 to 99% non condensing	
Sealing:	IP65	
Ambient temperature:		
Specified:	5 to 45°C/41 to 113°F	
Operating:	0 to 50°C/32 to 122°F	
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)	

User Guide Thermometer

2.6 M7 Series Thermometers

Thermometer Model	M7 25/375C	M7 75/700F
Temperature range:	25 to 375°C	75 to 700°F
Wavelength:	3.43µm (nominal)	
Response time:	<100ms (0 to 95%)	
Sighting:	6°, through the lens	
Target size:	≥98% of energy within graticule image	
Magnification:	1.8x	
Eye relief:	30mm/1.2in	
Field of view (nominal):	30:1	
Focus range:		
Standard:	0.5m/19.7in to infinity	
Short variable focus	0.35m/13.6in to 1.0m/39.3in	
Min. target diameter:	11.7mm/0.46in	
Accuracy		
Repeatability	1.5°C/2.7°F	
Absolute:	3K	
Stability (Temp):	0.1°/° amb	
Stability (Time):	2°C/4°F per year	
Vibration:	3G Any axis 10 to 300 Hz	
Humidity:	0 to 99% non condensing	
Sealing:	IP65	
Ambient temperature:		
Specified:	5 to 45°C/41 to 113°F	
Operating:	0 to 50°C/32 to 122°F	
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)	

SYSTEM4 Page 9

2.7 M8 Series Thermometers

Thermometer Model	M8 0/1000C	M8 30/1830F
Temperature Range:	0 to 1000°C	30 to 1830°F
Wavelength:	8 to 14µm	
Response Time:	100ms (0 to 95%)	
Sighting:	6° through the lens	
Target Size:	≥98% of energy within graticule	
Magnification:	1.8x	
Eye Relief:	30mm (1.2in)	
Field Of View (Nominal):	100:1	
Focus Range Standard:	0.5m (19.7in) to infinity	
Min. Target Diameter:	5mm (0.2in)	
Accuracy Repeatability: Absolute: Interchangeability:	 ≤1K 1%K+1K 2K	
Stability (Temperature): Stability (Time):	0.3°/°ambient 2°C (4°F) per year	
Vibration:	3G any axis 10 to 300 Hz	
Humidity:	0 to 99% non condensing	
Sealing:	To IP65 / NEMA 4X requirements	
Ambient Temperature Specified: Operating:	 0 to 45°C (32 to 113°F) 0 to 70°C (32 to 158°F)	
CE	EN 50-082-2 (immunity) EN 50-081-1 (emission) IEC 1010 (safety)	

Thermometer User Guide

2.7 M8 Series Thermometers

Thermometer Model	M8 0/1000C	M8 30/1830F
Temperature Range:	0 to 1000°C	30 to 1830°F
Wavelength:	8 to 14µm	
Response Time:	100ms (0 to 95%)	
Sighting:	6° through the lens	
Target Size:	≥98% of energy within graticule	
Magnification:	1.8x	
Eye Relief:	30mm (1.2in)	
Field Of View (Nominal):	100:1	
Focus Range Standard:	0.5m (19.7in) to infinity	
Min. Target Diameter:	5mm (0.2in)	
Accuracy Repeatability: Absolute: Interchangeability:	 ≤1K 1%K+1K 2K	
Stability (Temperature): Stability (Time):	0.3°/°ambient 2°C (4°F) per year	
Vibration:	3G any axis 10 to 300 Hz	
Humidity:	0 to 99% non condensing	
Sealing:	To IP65 / NEMA 4X requirements	
Ambient Temperature Specified: Operating:	 0 to 45°C (32 to 113°F) 0 to 70°C (32 to 158°F)	
CE	EN 50-082-2 (immunity) EN 50-081-1 (emission) IEC 1010 (safety)	

Page 10 SYSTEM4

2.8 R1 Series Thermometers

Thermometer Model	R1 600/1600C	R1 1100/2900F	R1 1000/2600C	R1 1800/4700F
Temperature range:	600 to 1600°C	1100 to 2900°F	1000 to 2600°C	1800 to 4700°F
Wavelength:	0.85 to 1.1µm			
Response time:	15ms (0 to 95%)			
Sighting:	6°, through the lens			
Target size:	≥98% of energy within graticule image			
Magnification:	1.8x			
Eye relief:	30mm/1.2in			
Field of view (nominal):	50:1		200:1	
Focus range:				
Standard:	0.5m/19.7in to infinity			
Short variable focus	0.35m/13.6in to 1.0m/39.3in			
Min. target diameter:	7mm/0.27in		1.8mm/0.07in	
Accuracy				
Repeatability:	≤1K		≤2K	
Absolute:	≤0.65%K		≤1.1%K	
Stability (Temp):	0.05%/°ambient		0.1%/°ambient	
Stability (Time):	2°C/4°F per year		2°C/4°F per year	
Vibration:	3G Any axis 10 to 300 Hz			
Humidity:	0 to 99% non condensing			
Sealing:	IP65			
Ambient temperature:				
Specified:	0 to 50°C/32 to 122°F			
Operating:	-10 to 60°C/14 to 140°F			
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)			

User Guide Thermometer

2.8 R1 Series Thermometers

Thermometer Model	R1 600/1600C	R1 1100/2900F	R1 1000/2600C	R1 1800/4700F
Temperature range:	600 to 1600°C	1100 to 2900°F	1000 to 2600°C	1800 to 4700°F
Wavelength:	0.85 to 1.1µm			
Response time:	15ms (0 to 95%)			
Sighting:	6°, through the lens			
Target size:	≥98% of energy within graticule image			
Magnification:	1.8x			
Eye relief:	30mm/1.2in			
Field of view (nominal):	50:1		200:1	
Focus range:				
Standard:	0.5m/19.7in to infinity			
Short variable focus	0.35m/13.6in to 1.0m/39.3in			
Min. target diameter:	7mm/0.27in		1.8mm/0.07in	
Accuracy				
Repeatability:	≤1K		≤2K	
Absolute:	≤0.65%K		≤1.1%K	
Stability (Temp):	0.05%/°ambient		0.1%/°ambient	
Stability (Time):	2°C/4°F per year		2°C/4°F per year	
Vibration:	3G Any axis 10 to 300 Hz			
Humidity:	0 to 99% non condensing			
Sealing:	IP65			
Ambient temperature:				
Specified:	0 to 50°C/32 to 122°F			
Operating:	-10 to 60°C/14 to 140°F			
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)			

SYSTEM4 Page 11

3.0 INSTALLING THE THERMOMETER

This section contains similar information to the thermometer Installation Guide.

If the thermometer is to be used in conjunction with a protection jacket and air purge, refer to the installation guides provided with those accessories.

If the thermometer is to be installed in a location where the ambient temperature is within the ranges specified for the thermometer, and no air purging is required to keep the lens clean, the thermometer can be mounted using the two tapped holes on the mounting pad. Either hole can be used for direct tripod mounting.

A swivel ball mounting (S4 - B) is available from Land infrared. This mounting accessory enables you to easily adjust the thermometer's line of sight.

3.1 Choosing a location for the thermometer

If your thermometer is an 'M' series thermometer (e.g. M1 600 / 1600 C), it must be positioned such that, at the chosen target distance, the target is large enough to completely fill the area covered by the graticule of the eyepiece (Refer to Section 3.1.1). The thermometer's view of the target area must not be obstructed.

If your thermometer is an 'R' series thermometer (e.g. R1 1000 / 2600 C), it is not essential for the target to completely fill the area covered by the graticule.

The overall dimensions of the thermometer installation are given in Fig. 4.

3.1.1 Target size calculation

There are two types of lens available for use with the System 4 thermometer.

The standard lens	Focusable from 500mm to infinity denoted [VG/VC]
The short focus lens	Focusable from 350mm to 1000mm denoted [SG/SF]

For both lenses, the target area is defined as the area covered by the graticule.

To calculate the minimum target size at any distance, refer to Fig. 5.

Thermometer User Guide

3.0 INSTALLING THE THERMOMETER

This section contains similar information to the thermometer Installation Guide.

If the thermometer is to be used in conjunction with a protection jacket and air purge, refer to the installation guides provided with those accessories.

If the thermometer is to be installed in a location where the ambient temperature is within the ranges specified for the thermometer, and no air purging is required to keep the lens clean, the thermometer can be mounted using the two tapped holes on the mounting pad. Either hole can be used for direct tripod mounting.

A swivel ball mounting (S4 - B) is available from Land infrared. This mounting accessory enables you to easily adjust the thermometer's line of sight.

3.1 Choosing a location for the thermometer

If your thermometer is an 'M' series thermometer (e.g. M1 600 / 1600 C), it must be positioned such that, at the chosen target distance, the target is large enough to completely fill the area covered by the graticule of the eyepiece (Refer to Section 3.1.1). The thermometer's view of the target area must not be obstructed.

If your thermometer is an 'R' series thermometer (e.g. R1 1000 / 2600 C), it is not essential for the target to completely fill the area covered by the graticule.

The overall dimensions of the thermometer installation are given in Fig. 4.

3.1.1 Target size calculation

There are two types of lens available for use with the System 4 thermometer.

The standard lens Focusable from 500mm to infinity denoted [VG/VC]
The short focus lens Focusable from 350mm to 1000mm denoted [SG/SF]

For both lenses, the target area is defined as the area covered by the graticule.

To calculate the minimum target size at any distance, refer to Fig. 5.

Page 12 SYSTEM4

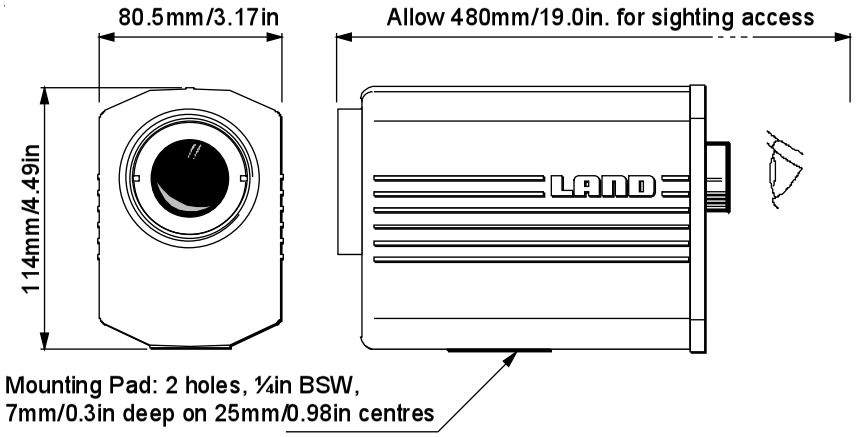
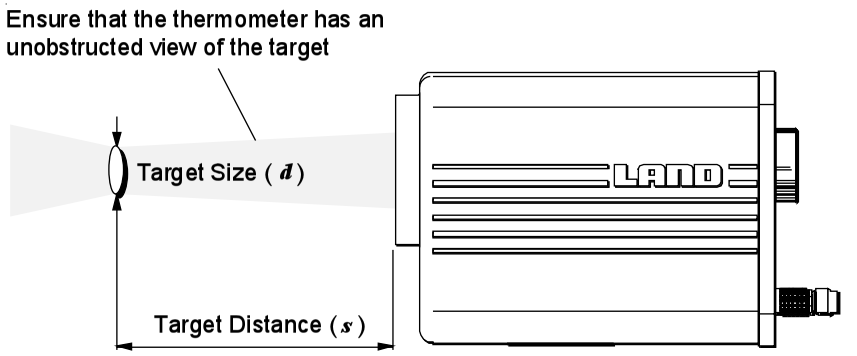


Fig. 4 Thermometer installation dimensions S4970225



$$\text{Target Size } (d) = \frac{\text{Target Distance } (s)}{\text{FOV*}}$$

* FOV -Refer to your thermometer's specification for this value.
i.e. If the Field of view is 100:1, use '100' for the FOV value.

Fig. 5 Target Size calculation S4970226

User Guide Thermometer

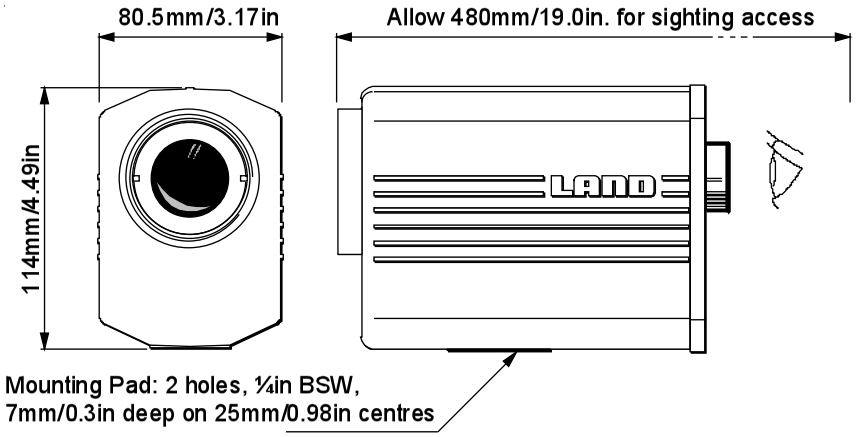
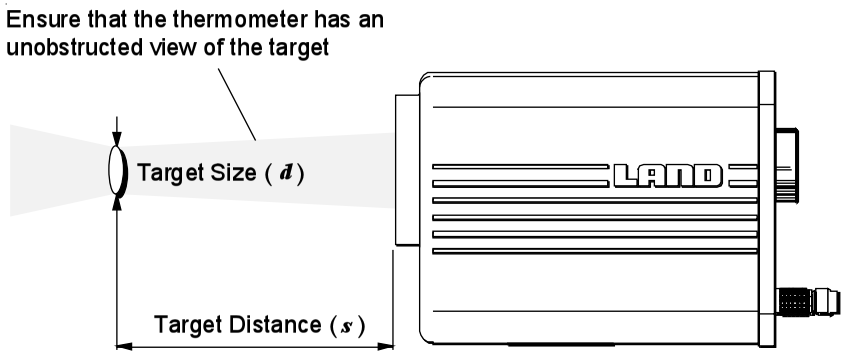


Fig. 4 Thermometer installation dimensions S4970225



$$\text{Target Size } (d) = \frac{\text{Target Distance } (s)}{\text{FOV*}}$$

* FOV -Refer to your thermometer's specification for this value.
i.e. If the Field of view is 100:1, use '100' for the FOV value.

Fig. 5 Target Size calculation S4970226

4.0 USINGTHETHERMOMETER

Once the thermometer has been installed in its chosen location, the lens must be focused on the target area.

NOTE

If the object to be measured is suspected of being at a temperature higher than 1600°C ensure that the eye comfort filter is fitted before proceeding with installation.

4.1 Focusing the lens on the target

To focus on the target.

(i) Remove the lens protection cap from the thermometer.

(ii) Remove the eyepiece protection cap on the rear face of the thermometer to reveal the Focus ring (See Fig. 6).

(iii) Look through the eyepiece. If you wear spectacles, you do not need to remove them, as the graticule image is positioned for viewing either with or without corrected vision.

The target area is defined as the area within the graticule.

NOTE

The image in the viewfinder appears upside down.

(iv) If the required target is not within the graticule, adjust the thermometer mounting until the target fills the graticule.

NOTE

A range of thermometer mounting accessories, to suit all measurement locations, is available from Land Infrared.

(v) Turn the focus ring to bring the target into focus.

To move the focus nearer to the thermometer turn the ring clockwise.

Thermometer User Guide

4.0 USINGTHETHERMOMETER

Once the thermometer has been installed in its chosen location, the lens must be focused on the target area.

NOTE

If the object to be measured is suspected of being at a temperature higher than 1600°C ensure that the eye comfort filter is fitted before proceeding with installation.

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The target area is defined as the area within the graticule.

NOTE

The image in the viewfinder appears upside down.

(iv) If the required target is not within the graticule, adjust the thermometer mounting until the target fills the graticule.

NOTE

A range of thermometer mounting accessories, to suit all measurement locations, is available from Land Infrared.

(v) Turn the focus ring to bring the target into focus.

To move the focus nearer to the thermometer turn the ring clockwise.

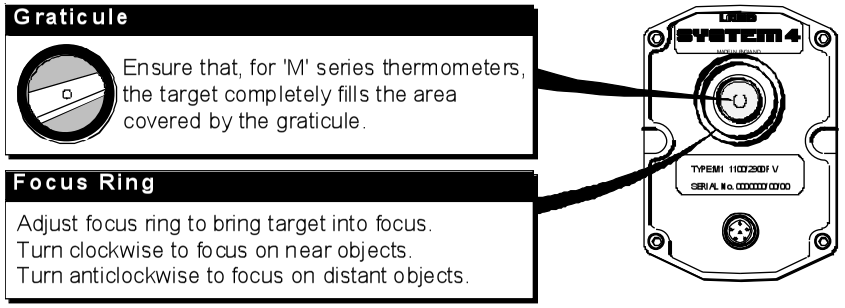

Graticule
Ensure that, for 'M' series thermometers, the target completely fills the area covered by the graticule.
Focus Ring
Adjust focus ring to bring target into focus.
Turn clockwise to focus on near objects.
Turn anticlockwise to focus on distant objects.
SYSTEM4
TYPE:M1 1100/2900 F V
SERIAL No. 0000000/00/00

Fig. 6 Location of Focus Ring and Graticule on rear face of thermometer S4970227

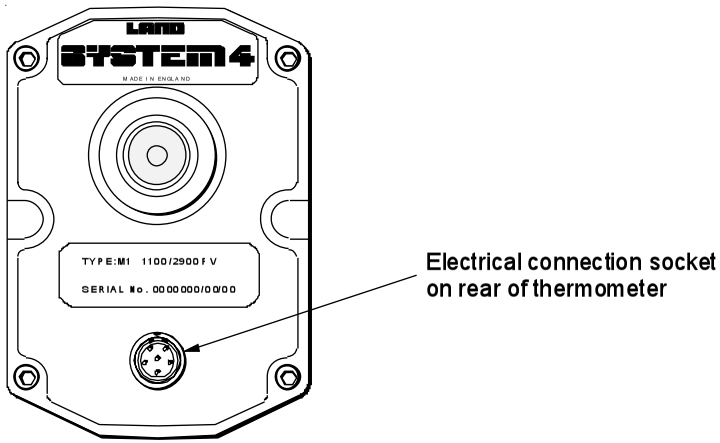


Fig. 7 Location of 6-way electrical connection socket S4970228

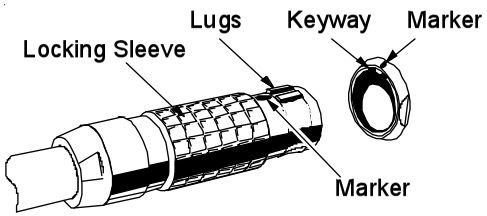


Fig. 8 Connection of the pre-wired cable to the thermometer S4970229

User Guide Thermometer

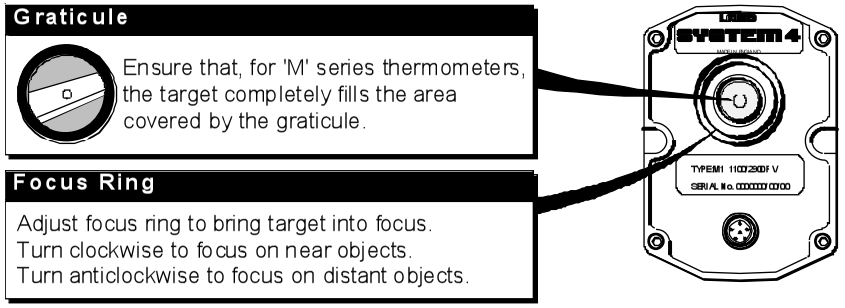

Graticule
Ensure that, for 'M' series thermometers, the target completely fills the area covered by the graticule.
Focus Ring
Adjust focus ring to bring target into focus.
Turn clockwise to focus on near objects.
Turn anticlockwise to focus on distant objects.
SYSTEM4
TYPE:M1 1100/2900 F V
SERIAL No. 0000000/00/00

Fig. 6 Location of Focus Ring and Graticule on rear face of thermometer S4970227

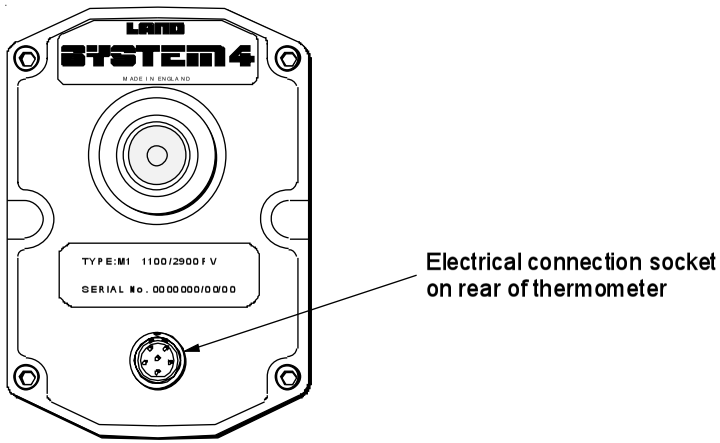


Fig. 7 Location of 6-way electrical connection socket S4970228

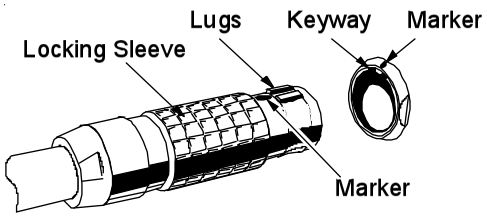


Fig. 8 Connection of the pre-wired cable to the thermometer S4970229

To move the focus away from the thermometer turn the ring anticlockwise.

(vi) To check that the target is in focus, use the 'parallax' method. i.e. look through the eyepiece and make small side-to-side movements of your head. The target is in best focus when there is no apparent movement of the image with respect to the graticule.

(vii) Make any necessary adjustments to the thermometer's mounting to ensure that it is viewing the required target.

(viii) When the target is in focus and, for 'M' series thermometers, the target fills the graticule, replace the eyepiece protection cap and ensure that the thermometer is mounted securely.

4.2 Electrical Connections

The electrical connections for the thermometer's power supply, emissivity input and temperature output are made via the 6-way socket on the rear of the thermometer. See Fig. 7.

Electrical connection to the thermometer must be made by either the pre-wired plug (LAND Part Nº 029.673) or via the plug housed in the Back Cap (LAND Part Nº 091.562).

To connect the cable;

(i) Refer to Fig. 8. Align the red marker near the lugs of the pre-wired plug with the red marker above the keyway in the socket on the thermometer.

(ii) Push the plug into the socket.

To disconnect the cable;

(i) Grip the locking sleeve section of the plug.

(ii) Pull the plug outwards to release the locking mechanism and disconnect the cable.

Thermometer User Guide

To move the focus away from the thermometer turn the ring anticlockwise.

(vi) To check that the target is in focus, use the 'parallax' method. i.e. look through the eyepiece and make small side-to-side movements of your head. The target is in best focus when there is no apparent movement of the image with respect to the graticule.

(vii) Make any necessary adjustments to the thermometer's mounting to ensure that it is viewing the required target.

(viii) When the target is in focus and, for 'M' series thermometers, the target fills the graticule, replace the eyepiece protection cap and ensure that the thermometer is mounted securely.

4.2 Electrical Connections

The electrical connections for the thermometer's power supply, emissivity input and temperature output are made via the 6-way socket on the rear of the thermometer. See Fig. 7.

Electrical connection to the thermometer must be made by either the pre-wired plug (LAND Part Nº 029.673) or via the plug housed in the Back Cap (LAND Part Nº 091.562).

To connect the cable;

(i) Refer to Fig. 8. Align the red marker near the lugs of the pre-wired plug with the red marker above the keyway in the socket on the thermometer.

(ii) Push the plug into the socket.

To disconnect the cable;

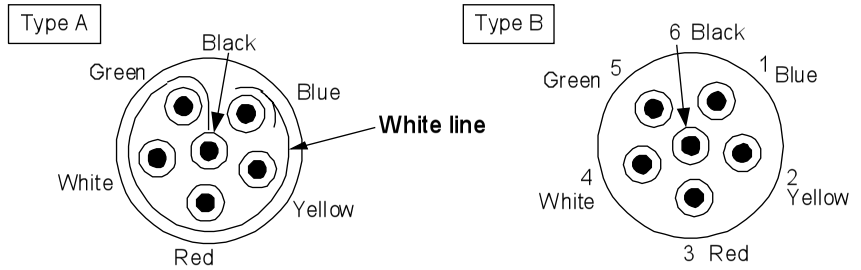
(i) Grip the locking sleeve section of the plug.

(ii) Pull the plug outwards to release the locking mechanism and disconnect the cable.

Page 16 SYSTEM4

Cable Colour	Label	Function
Yellow	T	4 to 20mA linear temperature signal drive
Blue	T-	4 to 20mA linear temperature signal return
White	E+	4 to 20mA emissivity signal drive
Screen	Screen	Screen
Red	V	24 to 30V d.c. power (positive)
Black	V-	24 to 30V d.c. power (negative)
Green	E-	4 to 20mA emissivity signal return

Note:-
Two different variants of plug may be encountered - Type A or Type B



Screen is connected to shell of connector at thermometer end of cable and pin 4 of processor connector.

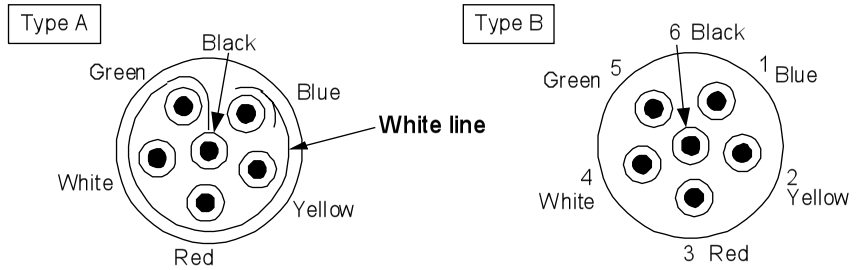
View from solder bucket side of 6-way connectors

Fig. 9 Cable connection schedule S4970482

User Guide Thermometer

Cable Colour	Label	Function
Yellow	T	4 to 20mA linear temperature signal drive
Blue	T-	4 to 20mA linear temperature signal return
White	E+	4 to 20mA emissivity signal drive
Screen	Screen	Screen
Red	V	24 to 30V d.c. power (positive)
Black	V-	24 to 30V d.c. power (negative)
Green	E-	4 to 20mA emissivity signal return

Note:-
Two different variants of plug may be encountered - Type A or Type B



Screen is connected to shell of connector at thermometer end of cable and pin 4 of processor connector.

View from solder bucket side of 6-way connectors

Fig. 9 Cable connection schedule S4970482

SYSTEM4 Page 17

4.2.1 Electrical connection to Landmark processors

The electrical connections required by the System 4 Thermometer are as follows:

(i) 30V between V+ and V-.
(ii) 4 to 20mA input on E+ and E- to represent emissivity of 0.2 to 1.0.
(iii) 4 to 20mA output on T+ and T- giving temperature linearly across the thermometer range.

NOTE

R series thermometers read under-range for 2 to 3 minutes after turn-on, as the thermometer warms up.

When the thermometer is used in conjunction with a System 4 Landmark Processor, the thermometer derives its power supply, emissivity input and temperature output from the processor. To connect the thermometer to the processor, use the 6-way cable from the thermometer to wire up the 7-way cable connector supplied with the processor (Refer to the Processor Installation Guide). The cable connection schedule is given in Fig. 9.

Thermometer User Guide

4.2.1 Electrical connection to Landmark processors

The electrical connections required by the System 4 Thermometer are as follows:

(i) 30V between V+ and V-.
(ii) 4 to 20mA input on E+ and E- to represent emissivity of 0.2 to 1.0.
(iii) 4 to 20mA output on T+ and T- giving temperature linearly across the thermometer range.

NOTE

R series thermometers read under-range for 2 to 3 minutes after turn-on, as the thermometer warms up.

When the thermometer is used in conjunction with a System 4 Landmark Processor, the thermometer derives its power supply, emissivity input and temperature output from the processor. To connect the thermometer to the processor, use the 6-way cable from the thermometer to wire up the 7-way cable connector supplied with the processor (Refer to the Processor Installation Guide). The cable connection schedule is given in Fig. 9.

Page 18 SYSTEM4

5.0 EMISSIVITY TABLES

In order to obtain accurate temperature measurements, the emissivity value of the target surface must be known. This section of the Thermometer User Guide contains emissivity values of the most commonly measured materials for each System 4 thermometer. Where no emissivity value is quoted, this means that either the thermometer is not suitable for the measurement application or the temperature of the target is outside the thermometer's measurement span. If you have a query regarding the emissivity of the target in your measurement application, contact Land Infrared.

5.1 Refractories

Refractories						
Material		System 4 Thermometer Series				
		M1	M2	M4	M6	M8
Alumina		0.30	0.30	0.30	0.40	0.60
Brick	*red*	0.80	0.80	0.80	0.93	0.90
	white refractory	0.30	0.35	-	-	0.80
	silica	0.55	0.60	-	-	0.80
	sillimanite	0.60	0.60	-	-	0.60
Ceramics		0.40	0.50	-	-	0.90
Magnesite		-	-	0.60	-	-

S4T006002

5.2 Alloys

Alloys						
Material		System 4 Thermometer Series				
		M1	M2	M4	M6	M8
Brass		0.20	0.18	-	0.10	0.03
	Oxidised	0.70	0.70	0.70	0.61	0.60
Chromel & Alumel		0.30	0.30	0.30	-	0.30
	Oxidised	0.80	0.80	0.80	-	0.80
Constantin & Manganin		0.25	0.22	0.20	-	0.05
	Oxidised	0.65	0.60	0.60	-	0.35
Inconel		0.30	0.30	0.30	0.28	0.10
	Oxidised	0.85	0.85	0.85	0.85	0.85
Monel		0.25	0.22	0.20	0.10	0.10
	Oxidised	0.70	0.70	0.70	0.45	0.70
Nichrome		0.30	0.28	-	-	0.20
	Oxidised	0.85	0.85	0.85	0.90	0.85

S4T006003

User Guide Thermometer

5.0 EMISSIVITY TABLES

In order to obtain accurate temperature measurements, the emissivity value of the target surface must be known. This section of the Thermometer User Guide contains emissivity values of the most commonly measured materials for each System 4 thermometer. Where no emissivity value is quoted, this means that either the thermometer is not suitable for the measurement application or the temperature of the target is outside the thermometer's measurement span. If you have a query regarding the emissivity of the target in your measurement application, contact Land Infrared.

5.1 Refractories

Refractories						
Material		System 4 Thermometer Series				
		M1	M2	M4	M6	M8
Alumina		0.30	0.30	0.30	0.40	0.60
Brick	*red*	0.80	0.80	0.80	0.93	0.90
	white refractory	0.30	0.35	-	-	0.80
	silica	0.55	0.60	-	-	0.80
	sillimanite	0.60	0.60	-	-	0.60
Ceramics		0.40	0.50	-	-	0.90
Magnesite		-	-	0.60	-	-

S4T006002

5.2 Alloys

Alloys						
Material		System 4 Thermometer Series				
		M1	M2	M4	M6	M8
Brass		0.20	0.18	-	0.10	0.03
	Oxidised	0.70	0.70	0.70	0.61	0.60
Chromel & Alumel		0.30	0.30	0.30	-	0.30
	Oxidised	0.80	0.80	0.80	-	0.80
Constantin & Manganin		0.25	0.22	0.20	-	0.05
	Oxidised	0.65	0.60	0.60	-	0.35
Inconel		0.30	0.30	0.30	0.28	0.10
	Oxidised	0.85	0.85	0.85	0.85	0.85
Monel		0.25	0.22	0.20	0.10	0.10
	Oxidised	0.70	0.70	0.70	0.45	0.70
Nichrome		0.30	0.28	-	-	0.20
	Oxidised	0.85	0.85	0.85	0.90	0.85

S4T006003

5.3 Metals

Metals					
Material	System 4 Thermometer Series				
	M1	M2	M4	M6	M8
Aluminium	0.13	0.09	0.08	0.05	0.025
Oxidised	0.40	0.40	0.40	0.30	0.35
Chromium	0.43	0.34	-	0.15	0.07
Oxidised	0.75	0.80	-	-	0.85
Cobalt	0.32	0.28	-	0.18	0.04
Oxidised	0.70	0.65	-	-	0.35
Copper	0.06	0.05	0.04	0.04	0.03
Oxidised	0.85	0.85	0.85	0.85	0.80
Gold	0.05	0.02	0.02	0.02	0.02
Iron & Steel	0.35	0.30	-	0.18	0.10
Oxidised	0.85	0.85	0.85	0.85	0.80
Lead	0.35	0.28	-	0.16	0.13
Oxidised	0.65	0.65	0.65	0.63	0.65
Magnesium	0.27	0.24	0.20	0.12	0.07
Oxidised	0.75	0.75	0.75	-	0.75
Molybdenum	0.33	0.25	-	0.07	0.10
Oxidised	0.80	0.80	0.80	0.80	0.80
Nickel	0.35	0.25	-	0.15	0.04
Oxidised	0.85	0.85	-	-	0.85
Palladium	0.28	0.23	-	0.08	0.05
Platinum	0.27	0.22	0.18	0.10	0.07
Rhodium	0.25	0.18	-	0.07	0.05
Silver	0.05	0.04	0.04	0.03	0.02
Oxidised	0.10	0.10	0.10	-	0.12
Tin	0.40	0.28	0.12	0.09	0.06
Oxidised	0.60	0.60	0.60	-	0.60
Titanium	0.55	0.50	0.42	0.30	0.15
Oxidised	0.80	0.80	-	-	0.60
Tungsten	0.39	0.30	0.20	0.13	0.06
Zinc	0.50	0.32	0.10	0.05	0.04
Oxidised	0.60	0.55	-	0.11	0.30

S4T006004

Thermometer User Guide

5.3 Metals

Metals

Material | System 4 Thermometer Series | M1 | M2 | M4 | M6 | M8

Aluminium 0.13 0.09 0.08 0.05 0.025
Oxidised 0.40 0.40 0.40 0.30 0.35
Chromium 0.43 0.34 - 0.15 0.07
Oxidised 0.75 0.80 - - 0.85
Cobalt 0.32 0.28 - 0.18 0.04
Oxidised 0.70 0.65 - - 0.35
Copper 0.06 0.05 0.04 0.04 0.03
Oxidised 0.85 0.85 0.85 0.85 0.80
Gold 0.05 0.02 0.02 0.02 0.02
Iron & Steel 0.35 0.30 - 0.18 0.10
Oxidised 0.85 0.85 0.85 0.85 0.80
Lead 0.35 0.28 - 0.16 0.13
Oxidised 0.65 0.65 0.65 0.63 0.65
Magnesium 0.27 0.24 0.20 0.12 0.07
Oxidised 0.75 0.75 0.75 - 0.75
Molybdenum 0.33 0.25 - 0.07 0.10
Oxidised 0.80 0.80 0.80 0.80 0.80
Nickel 0.35 0.25 - 0.15 0.04
Oxidised 0.85 0.85 - - 0.85
Palladium 0.28 0.23 - 0.08 0.05
Platinum 0.27 0.22 0.18 0.10 0.07
Rhodium 0.25 0.18 - 0.07 0.05
Silver 0.05 0.04 0.04 0.03 0.02
Oxidised 0.10 0.10 0.10 - 0.12
Tin 0.40 0.28 0.12 0.09 0.06
Oxidised 0.60 0.60 0.60 - 0.60
Titanium 0.55 0.50 0.42 0.30 0.15
Oxidised 0.80 0.80 - - 0.60
Tungsten 0.39 0.30 0.20 0.13 0.06
Zinc 0.50 0.32 0.10 0.05 0.04
Oxidised 0.60 0.55 - 0.11 0.30

S4T006004

Page 20 SYSTEM4

5.4 Plastics (M7 Thermometer Only)

Plastics										
Material	Thickness (µm)									
	5	10	20	40	60	80	100	150	200	300
Acrylic	0.18	0.35	0.59	0.82	0.91	0.94	0.95	0.96	0.96	0.96
Cellulose Acetate	0.11	0.24	0.44	0.69	0.82	0.88	0.92	0.95	0.96	0.96
Polyester (PET)	0.03	0.09	0.21	0.39	0.53	0.64	0.72	0.83	0.90	0.94
Polyamide (Nylon)	0.35	0.59	0.82	0.94	0.96	0.96	0.96	0.96	0.96	0.96
Polycarbonate	0.07	0.18	0.34	0.58	0.73	0.82	0.87	0.93	0.95	0.96
Polyethylene	0.58	0.82	0.94	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Polypropylene	0.61	0.84	0.95	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Polystyrene	0.18	0.35	0.59	0.82	0.91	0.94	0.95	0.96	0.96	0.96
Polyurethane	0.14	0.29	0.51	0.76	0.87	0.92	0.94	0.96	0.96	0.96
Polyvinyl Chloride (PVC)	0.16	0.33	0.56	0.80	0.90	0.93	0.94	0.96	0.96	0.96
Polyvinyilidene Chloride (PVDC)	0.02	0.08	0.18	0.35	0.49	0.59	0.67	0.81	0.88	0.94

S4T006005

SYSTEM4
User Guide

5.4 Plastics (M7 Thermometer Only)

Plastics										
Material	Thickness (µm)									
	5	10	20	40	60	80	100	150	200	300
Acrylic	0.18	0.35	0.59	0.82	0.91	0.94	0.95	0.96	0.96	0.96
Cellulose Acetate	0.11	0.24	0.44	0.69	0.82	0.88	0.92	0.95	0.96	0.96
Polyester (PET)	0.03	0.09	0.21	0.39	0.53	0.64	0.72	0.83	0.90	0.94
Polyamide (Nylon)	0.35	0.59	0.82	0.94	0.96	0.96	0.96	0.96	0.96	0.96
Polycarbonate	0.07	0.18	0.34	0.58	0.73	0.82	0.87	0.93	0.95	0.96
Polyethylene	0.58	0.82	0.94	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Polypropylene	0.61	0.84	0.95	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Polystyrene	0.18	0.35	0.59	0.82	0.91	0.94	0.95	0.96	0.96	0.96
Polyurethane	0.14	0.29	0.51	0.76	0.87	0.92	0.94	0.96	0.96	0.96
Polyvinyl Chloride (PVC)	0.16	0.33	0.56	0.80	0.90	0.93	0.94	0.96	0.96	0.96
Polyvinyilidene Chloride (PVDC)	0.02	0.08	0.18	0.35	0.49	0.59	0.67	0.81	0.88	0.94

S4T006005

5.5 Miscellaneous

Miscellaneous Materials							
Material		System 4 Thermometer Series					
		M1	M2	M4	M5	M6	M8
Asbestos (Board/Paper/Cloth)		0.90	0.90	-	-	0.90	0.90
Asphalt		0.85	0.85	-	-	0.90	0.85
Carbon	*graphite*	0.85	0.85	-	-	0.85	0.80
	soot	0.95	0.95	-	-	0.95	0.95
Cement & Concrete		0.65	0.70	-	-	0.90	0.90
Cloth (all types-close weave) [Open weave reduces emissivity]		0.75	0.80	0.85	-	0.85	-
Glass	*3mm thick*	-	-	-	0.96	>0.90	-
	6mm thick	-	-	-	0.96	>0.90	-
	12mm thick	-	-	-	0.96	>0.90	-
	20mm thick	0.80	-	-	0.96	>0.90	-

S4T006006

Thermometer User Guide

5.5 Miscellaneous

Miscellaneous Materials

Material		System 4 Thermometer Series					
		M1	M2	M4	M5	M6	M8
Asbestos (Board/Paper/Cloth)		0.90	0.90	-	-	0.90	0.90
Asphalt		0.85	0.85	-	-	0.90	0.85
Carbon	*graphite*	0.85	0.85	-	-	0.85	0.80
	soot	0.95	0.95	-	-	0.95	0.95
Cement & Concrete		0.65	0.70	-	-	0.90	0.90
Cloth (all types-close weave) [Open weave reduces emissivity]		0.75	0.80	0.85	-	0.85	-
Glass	*3mm thick*	-	-	-	0.96	>0.90	-
	6mm thick	-	-	-	0.96	>0.90	-
	12mm thick	-	-	-	0.96	>0.90	-
	20mm thick	0.80	-	-	0.96	>0.90	-

S4T006006

Page 22 SYSTEM4

6.0 MAINTENANCE

Thermometer maintenance consists mainly of ensuring that the lens is clean. If the lens becomes dirty clean it with lens cleaning fluid and a soft cloth.

If it is found that the lens is repeatedly becoming dirty, it may be necessary to use the thermometer in conjunction with the System 4 air purge (LAND Part Nº 091.561). Contact LAND Infrared for more information.

If the thermometer is used in conjunction with a cooling jacket, ensure that there is an adequate supply of cooling water.

WARNING

Never 'over-cool' the thermometer as this may result in condensation either on or inside the thermometer.

The flow rate required for cooling water is 1 litre per minute (0.035 cu. ft per minute).

If the thermometer is used in conjunction with an air purge, check that there is an adequate supply of clean air.

The flow rate required for purge air is 1 litre per second (2 cu. ft per minute).

User Guide Thermometer

6.0 MAINTENANCE

Thermometer maintenance consists mainly of ensuring that the lens is clean. If the lens becomes dirty clean it with lens cleaning fluid and a soft cloth.

If it is found that the lens is repeatedly becoming dirty, it may be necessary to use the thermometer in conjunction with the System 4 air purge (LAND Part Nº 091.561). Contact LAND Infrared for more information.

If the thermometer is used in conjunction with a cooling jacket, ensure that there is an adequate supply of cooling water.

WARNING

Never 'over-cool' the thermometer as this may result in condensation either on or inside the thermometer.

The flow rate required for cooling water is 1 litre per minute (0.035 cu. ft per minute).

If the thermometer is used in conjunction with an air purge, check that there is an adequate supply of clean air.

The flow rate required for purge air is 1 litre per second (2 cu. ft per minute).

SYSTEM4 Page 23

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Thermometer User Guide

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SYSTEM4